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who wish to obtain these volumes, should send in their names to the Secretary, Rev. T. Wiltshire, 25 Granville Park, Lewisham, London, S. E., England. We regard the publication of these sketches and descriptions as a great boon to American entomologists, in default of good figures of native larvæ.——At the meeting of the London Entomological Society, October 3, Mr. Wailly exhibited a Samia allied to *S. cecropia*, and possibly a hybrid between it and some other (unknown) species.——" The Butterflies of Maine" by Professor C. H. Fernald, is rich in new facts regarding the distribution and habits of these insects. It is rather startling to read of the occurrence of *Chionobas jutta* at Orono and of *Terias lisa* in the Isle of Shoals, *Euptoieta claudia* near Portland, and *Junonia coenia* near Bangor. Sixty-nine species are enumerated.——Dr. Heylaerts has nearly ready for publication a monograph of the Psychides of the world. In the *Compte-rendu* of the Entomological Society of Belgium, besides notes on European species, he describes four new species from the Argentine Republic, and also a new Cossus-like genus from Chirequi, under the name of *Romanoffia imperialis*.——In his paper on North American Papilionine and Nymphalinine caterpillars published in the Jena *Zeitschrift*, Professor A. Gruber carries on the work begun by Weismann in his great work on seasonal dimorphism, and describes and figures five stages of the larvæ of *Papilio asterias* and five of those of *P. turnus*, five of *P. troilus* and four of *P. ajax*, and five of *P. philenor*; of the Nymphalines four stages of *Melitæa phaëton*, three of *Melitæa marcia*, three of *M. nycteis*, two of *Argynnis myrina*. The paper closes with some general remarks; it will greatly interest American lepidopterists. The sketches alone tell a striking story.

ZOÖLOGY.

THE LIFE-HISTORY OF THALASSEMA.—Mr. H. W. Conn publishes, in the studies from the Biological Laboratory of Johns Hopkins University (Vol. III, No. I), an abstract of his researches on the early stages of this Echiurid worm. The species under observation he regards as new, and mentions it under the name of *Thalassema melita*; it is of a dull red color, with a light yellow preoral lobe. It has the habit of seizing upon empty sand dollars and making its home in them. It enters the mouth of the shell while very small, but once within it grows to a considerable size, and remains the rest of its life a prisoner.

The most important points observed are the following:

1. The origin of the ova and spermatozoa as modified peritoneal cells; their growth in the body-cavity, and their preservation in a sexually mature condition in the sexual pouches.
2. Protrusion of two polar globules exhibiting a rhythm precisely similar to that of the segmenting ova.

3. Segmentation, which is, exceptionally among Annelids, perfectly regular.

4. Formation of gastrula by a typical invagination.

5. The early appearance of a preoral band of cilia and its subsequent disappearance and replacement by a *row* of longer, more powerful cilia.

6. The transformation of the gastrula into a trochosphere by a peculiar method of growth.

7. Origin of mesoderm as two-fold, and the segmentation of mesodermal bands.

8. Origin of ventral nerve chord from the ectoderm as a bilateral structure.

ANATOMY OF THE STOMACH OF STALK-EYED CRUSTACEA.—This subject, lately treated by E. Nauck, is being discussed in a more extended manner by F. Mocquard in the *Annales des Sciences Naturelles.* As is well known the stomach of the Decapoda is armed at the pyloric end with numerous calcareous pieces which project into the cavity and constitute, in the author's opinion, a powerful apparatus for the trituration of the food, while the membranous invaginations give rise to a more or less complicated valvular system. Nauck, who published his paper in the *Zeitschrift für wissen. Zoologie*, described the gastric skeleton alone of the crabs, but Mocquard extends his investigations to all the stalk-eyed Crustacea, and also studies the muscles and stomachic nerves. The figures already published appear to have been carefully and clearly drawn. Meanwhile, F. Albert has an illustrated article on the same subject in the *Zeitschrift für wissen. Zoologie*, published Dec. 21, 1883.

THE CRAYFISH NOT DIMORPHOUS.—It has long been supposed that the species of Cambarus were dimorphous, there being two sets of males, differing mainly in the shape of the first pair of abdominal appendages. But in a paper published in the *American Journal of Science* for January, Professor Walter Faxon states that he received a lot of living *Cambarus rusticus* from Kentucky, males of the "first form" and females, which bred freely in confinement. After pairing, three of the males moulted. These soft-shelled individuals were found to be of the "second form;" their exuviæ of the "first form!" After attaining the "first form" and after pairing, the same individual has reverted to the "second form." It is now clear that we are not dealing with a case of true dimorphism, such as is well known among insects and plants, but it appears probable that the two forms of the crayfish are alternating periods in the life of the individual, the "first form" being assumed during the pairing season, the "second form" during the intervals between the pairing seasons. It is to be inferred that before the animal is again capable of reproduction, another moult will bring it again into the "first form." Professor Faxon observed the same fact in *C. pro-*

pinquus, a male specimen having been taken in the act of moulting. Faxon adds, that "such a change as this connected with the reproductive period is unparalleled, so far as I know, among the invertebrata; and even among the vertebrata, the cases of partial atrophy of the generative organs or shedding of antlers (as in the stag) after the rut is over are hardly comparable."

THE GLOTTIS OF SNAKES. — In the January number of the AMERICAN NATURALIST, Dr. C. A. White, of the National Museum at Washington, gave some highly interesting illustrations of the peculiar structure of the epiglottis that he had observed in the bull snake (Pityophis), and to which he attributes the loud, hoarse, "bellowing" sort of "hiss" for which this snake is remarkable. The individual which he examined is still alive, occupying a distinguished and exclusive position with two or three other snakes at the museum, and it amiably submitted to have its mouth held open while Dr. White kindly exhibited to me the very singular character of its epiglottis. It differs so obviously from that of any other snakes which I have had an opportunity of examining, that I venture to offer a few words to describe my own observations.

Dr. White thinks that as in snakes there is no comminution of food, any protection of the aperture of the wind-pipe in swallowing is unnecessary. In Pityophis the permanently erect position of what represents the epiglottis would certainly appear to be a sufficient protection, but in some others that I have watched while feeding (for the wind-pipe is often so far forward as to be easily observed), the glottis is closed tightly and remains closed, except when occasionally opened as if for the purpose of respiration and closed again; and the action appears to be entirely volitional, not regular, but as occasion requires. The impression imparted to the observer is, that the action is protective also; there is a sensitiveness and nervousness, so to speak, about the contracting and expanding orifice, as if the snake were guarding against the entrance of dust or any foreign substance while the trachea is in this exposed position, opened to breathe only, and quickly closed at will. When at rest and the snakes are not feeding, we see the anterior part of the windpipe lying along the mouth, somewhat in the form and position of a parrot's tongue; and in some small snakes you may occasionally discern the cartilaginous rings of the trachea through the delicate membrane. The orifice in those snakes that I have watched appears to be of a more simple construction than in Pityophis, and the epiglottis described and illustrated by Dr. White is either entirely absent or represented only by a slightly developed lip or valve at the lower part of the orifice, and called by Duméril a *petite languette*, which assists to more thoroughly close the glottis.

Dr. White informs me that he has not watched Pityophis while feeding, and cannot, therefore, tell whether the trachea protrudes from the mouth or not at that time. I hardly see how it can, with this stiff, erect barrier immediately in front of it to guard the opening, as when Dr. Yarrow and myself saw it expand. Indeed this protrusion of the trachea in snakes appears to be but little known; for notwithstanding their abundance in the woods in America, you do not often come upon a snake feeding, and zoölogical collections are at present few and far between. Nor does a snake invariably require to breathe while swallowing. During the many hours I have spent in watching the snakes on feeding days at the London Zoölogical Gardens, week after week for several years, I have seen the trachea protrude from the mouth perhaps once in a dozen meals. When the food is quickly and easily swallowed, the supply of air in the lungs is sufficient for the time; but should the prey be unusually bulky or awkward to manage, completely gorging the mouth, it may occupy a longer time to swallow, when to breathe afresh becomes requisite, and the difficulty is met by this adjustable wind-pipe. Not unfrequently a snake is an hour or more swallowing large-sized prey, during which time the mouth and throat are stretched to their utmost capacity, and then you may see the trachea projecting a full inch in the larger kinds. In chap. VIII of my work on "Snakes" I have entered more fully into the subject than space will here permit. Professor Owen describes the apparatus as the *glottis*, other writers speak of it as the *larynx*, while others again simply state that the *wind-pipe* may project beyond the mouth. I have observed it in the large oriental constrictors, the rattlesnakes, several of the African vipers, and even in some small snakes, as, for instance, *Heterodon d'orbignii* and the English ring snake; who in both cases were swallowing an inconveniently large frog, and the trachea was sufficiently forward to show the contracting and expanding action of its orifice. We hope to persuade Pityophis to partake of a meal while we are watching him, when there may be further observations to record. —*Catherine C. Hopley.*

ABNORMAL DEER ANTLERS FROM TEXAS.—The accompanying photographs of the skull and antlers of a deer were sent me from San Antonio, Texas, by Dr. Mortimor Slocum, with the information that the deer was killed by a hunter named Havey, on the Neuces river, about one hundred miles west of San Antonio, in August last, while the velvet was yet on the antlers; that the deer weighed 180 pounds, and that a companion was with the deer with antlers precisely the same as these. These antlers are fourteen inches long, and eight and a quarter broad, with seven points at each of the ends, and both are very much alike. This is the sum of the information given me of these remarkable antlers, and I am requested to classify the deer specifically.

These antlers are now in the collection of Mr. Dosch of San

Antonio. I examined this collection several years since, and must pronounce it the finest collection of deers' heads and antlers I ever saw anywhere; most of these were well mounted, and well arranged. Nearly all are of the common deer (*Cervus virginianus*) and taken in Texas; but there were one or two of the mule deer (*Cervus macrotes*) which I was informed were also taken in Texas.

With the limited information before me it is not easy to classify this specimen with absolute certainty. If I had but the tail or the skin of a hind leg I could classify it with as much certainty as if the whole animal was before me, for these are so nearly alike on every individual of each species and so unlike every other species as to be absolutely reliable, so far as my observations have extended.

The first inquiry which naturally presents itself is, are these antlers of the form and position of any known species of deer in America? The palmetation first attracts our attention. We have three species of deer in America, which have habitually and distinctively palmetted antlers, the moose (*Alces*) and the two species of caribou (*Tarandus*).

These antlers most resemble that of the moose, being broadly palmetted, with points or spurs on their upper borders, but in position they are entirely unlike those of the moose. The antlers of the moose are projected from the head in a nearly horizontal position, sometimes a little depressed, and sometimes a little elevated, the latter position being more frequently observed on the young animal. The palmetation does not become pronounced till after he is four years old.

The position of these antlers appears to be approximately vertical, spreading, possibly, thirty degrees from the vertical.

Not the rudiment of a basal snag is formed on the antler of the moose. On these antlers the basal snags are large.

The form of these antlers differs still more widely from those of the caribou. These always have distinctive beams with long prongs which are liable to be palmetted at the ends, but the most distinctive characteristic is the brow tines which project downward over the face, with broad vertical palms at the ends, with spurs or fingers which approach each other, and which sometimes interlock like the fingers of two hands.

Indeed there can hardly be said to be a resemblance between the antlers under consideration and those of the caribou.

But if the resemblance to either were never so striking, the latitude in which the animal was found would forbid the suggestion of a relationship to either the moose or the caribou. All of these are boreal animals, occupying high northern latitudes. Maine and Montana may be considered the extreme southern limits of their habitat. I have seen fossil remains of the moose found as far south as Chicago, and I have met with statements that they have been found as far south as the Ohio river, but the live animals have not occurred in these regions within the historic period.

We may safely conclude that this deer is not a relative of any of the known species of deer which have habitually palmetted antlers. By no accident, or stress of circumstances could any of these northern species have been found as far south as Texas, and that, too, in the summer season.

Is it a new species hitherto unobserved with normal antlers like these? If a distinct species, it must be more or less numerous and habitual either in the region where it was found or in some other region whence it was possible for it to have wandered.

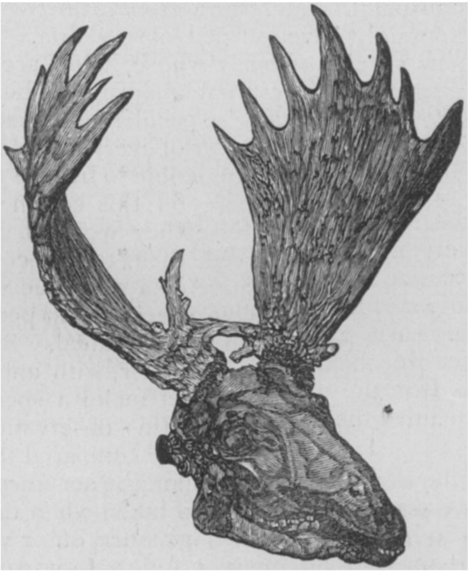
Now, this entire continent has been so thoroughly worked over during the last half century by competent naturalists, to say nothing of more numerous hunters, who do not overlook anything new or unusual, that so large and so distinctive an animal as this could not possibly have escaped observation. We may expect to find new species of birds whose habits are migatory, or possibly some small and nocturnal quadrupeds, but so large an animal as this deer, with antlers so peculiar and distinctive as to attract the attention and even wonder of every beholder, could not have escaped detection. It is impossible to believe that there is a whole race of animals anywhere on this continent habitually wearing such antlers as these, else they would have been seen before somewhere. We are forced, then, to the conclusion that this deer was not the representative of a new species of deer, but an individual of some well-known species, with peculiar and abnormal characteristics confined to the individual. But Mr. Havey says, there was a companion to this deer, with antlers precisely like these. Well, two bucks will not make a species, but may there not possibly be some error in this observation? Had he killed the other buck also, and critically compared them when lying side by side, we might not question the accuracy of his observation, but his view must have been taken when the deer was in life, standing at a greater or less distance off or when running, and whether there were intervening objects to impair the value of his observation we are not informed.

We need further information before we can determine what value we can place upon the opinion that both sets of antlers were precisely alike.

I am clearly of opinion that these antlers are of an abnormal growth, probably induced by some accident or violence inflicted upon the pedicels of the antlers, or upon the antlers themselves while growing in their early stages. Such accidents and consequently abnormal growths are not very uncommon. At p. 226 of "The Antelope and Deer of America," I give an illustration of the antlers of a common deer, showing as wide a departure as these from the normal type though of an entirely different character. That growth was undoubtedly induced by violence done to the antlers in the early stages of their growth. In that case as in this, the injury was to both alike and doubtless at the same time.

Evidence of a serious injury to this deer is not wanting, even in these photographs. In the side view we distinctly see a pronounced disfigurement in the nose or face below the eyes, or what we call in a horse a Roman nose. Now this never occurs naturally in any of the deer family, and so we may safely conclude that this deer had suffered serious violence in or about the head, and this I think the most probable explanation of the cause of these abnormal growths of the antlers.

This deer must have belonged to one of two species of deer. The Virginia deer is the most common species in that part of Texas where this deer was found. The mule deer is occasionally met with in Texas, though its occurrence is not very common. If the ears were small, the tail flattish and of a lanceolate form, and covered with white hairs on the under side and edges, and the naked black portion, covered with the reversed hairs which overlay the metatarsal gland on the outside of the hind leg, was not much more than one inch long and surrounded by a border of white hairs, then we should know certainly that it was a common Virginia deer though of twice the average size of this deer in Texas. If the ears were very large and heavy, the tail round and naked on the under side, covered else with white hairs except a black switch or tuft at the end, and if the naked black portion over the metatarsal gland was three or four inches long with no



Antlers of a deer shot in Texas.

white hairs about it, then we should certainly know it was a mule deer. These tails are illustrated in the work above referred to, on p. 234, and the glands on p. 254. But these indicia of species are entirely wanting, and we only have a picture of these abnormal antlers to enlighten us. If the antlers were normal we might determine the species with considerable confidence.

The antlers of the common deer are usually less spreading than those of the mule deer, though not always so, and in this respect these answer best to the former, though their position may have been altogether changed by the accident. The strongest evidence to show that it was a common deer I see in the basal snag near the butts of each antler; these are very large and both bifurcated. This snag is always present on the normal antler of the Virginia deer, and is usually present on that of the mule deer, but is very much smaller on the latter than on the former.

On the common deer this member is frequently bifurcated on large old specimens but never on the mule deer, though on large specimens we frequently see a rudimentary branch, but I have never seen anything like an equal bifurcation or even a fairly developed tine. But the bifurcations of these prongs are not as we see them in the natural growth. The prong divides into nearly equal parts very near its base and these separate at angles of seventy degrees or so. In the few cases where I have seen the basal snags fairly divided into approximately equal parts, the forks have grown up nearly parallel, but when the antler itself is so disfigured as this we should not expect any member to be in its natural form. It is the unusual proportionate size of this nasal snag which inclines me to attribute the specimen to a Virginia deer.

The size of the deer suggests a larger species than the common deer, which, as already suggested, is very considerably smaller in Texas than in higher and colder latitudes, but I have no doubt still larger specimens than this is claimed to be are occasionally met with in that country.

The mule deer is an appreciably larger species than the common deer, and hence, the large size of this specimen suggest this deer, but I can point out no other evidence which strongly indicates the mule deer; while the rarity of this species in the country where this was killed, and the abundance of the common deer suggests the latter as most probable.

I would give something for the ear or the tail of this deer that all doubts might be resolved; as it is I cannot tell to which of these two species this deer belonged from the mere picture of a damaged head and antlers of an unnatural growth. It is easier to tell what it is not.—*J. D. Caton.*

[*Note by the Editor.*—The case above cited by Judge Caton is paralleled by a similar one which came under my observation several years ago. A large and highly colored buck of the *Cariacus virginianus* was shot in Central New Jersey, in which the horns of both sides were completely and symmetrically palmated as in the moose. This modification of horns of Cariacus is just what is to be expected in accordance with law of "acceleration," and constitutes an actual transfer of such modified individuals to the genus Alces. The genera Alces and Cariacus agree with other American deer in the absence of the brow antler, and Alces stands at the head of the series by virtue of its palmation. If a similar change were to take place in a true deer of the genus Cervus, the result would be a Dama, a genus which agrees with Cervus in the possession of a brow antler, and differs from it as Alces does from Cariacus, *i. e.*, in its palmation. Instances of this kind show the correctness of the position I took in 1868,[1] that the change of generic characters is independent of that of the specific, and that one species may come, by acceleration in some of its individuals, to belong to two genera.—*E. D. Cope.*]

FORSYTH MAJOR ON THE TRUE PIGS.—In the *Zoologischer Anzeiger*, June, 1883, the above well known palæontologist gives an account of the recent species of true pigs with their extinct connections. He limits the existing species to three: *Sus verrucosus* M. and S. (Java, Celebes), *S. barbatus* M. and S. (Borneo), and *S. scrofa* L. He regards the *S. vittatus* M. and S. as a form of *S. scropha*, and finds that it has seventeen synonyms. These often represent minor variations of character, which do not form constant combinations. They are, as a whole, characteristic of immature conditions of the *S. scropha* of northern regions. Forsyth Major regards the *S. vittatus* as the primitive form. The *S. verrucosus* is nearly related to the *S. giganteus* Falc. of the Siwaliks, and the *S. strozzii* Menegh. of the Val d'Arno.

ZOÖLOGICAL NOTES.—*Mollusks.*—H. L. Osborn (Stud. Biol. Lab. J. Hopk. Univ.), gives the results of his studies of the gills of some prosobranchiate mollusca. Starting with the statement that the researches of Peck and Mitsukuri have made it tolerably clear that the highly complicated gills of some lamellibranchs are derivable from a simple series of folds of the body wall, he summarizes thus: "The gill of Chiton and Fissurella is closely like the ctenidium which Lankester considers the primitive type of molluscan gill. In ctenobranchs, almost universally, the gill is not a ctenidium, but a very much simpler organ. Its form compares closely with the gill which we have come to regard as the primitive lamellibranch gill." He inclines to the belief that the lamellibranchiata are degraded from cephalophorous ancestors, while their highly complex gills are due to "the sessile habit of the animal throwing upon the gills sundry functions besides those of the gill proper.

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[1] In "The Origin of Genera."

Crustacea.—H. W. Conn (Studies from the Biological Laboratory, Johns Hopkins Univ.), contributes some thoughtful observations and suggestions upon the signification of the larval skin with which the decapod zoea is covered on emerging from the egg. The apparent anomaly that certain low Macrura possess larvæ with a thorax, while the Schizopods have a zoea without a thorax, is explained by the assumption that the zoea stage is an intercalated adaptive form with the body shortened to enable the larva to swim better, while the protozoea, represented by the zoea of Penæus, is the ancestral form. By substituting the Protozoea for the Phyllopoda, Mr. Conn seeks to reconcile the classification of Boas with that of Packard, and with the teachings of embryology. ——Professor Greeff (Sitz. Ges. Natur. Marburg, 1882), gives an account of the land and fresh-water crabs of St. Thomas and Rolas, in the Gulf of Guinea. *Gecarcinus ruricola*, known from the West Indies, occurs also in incredible numbers in the Guinea islands. It is found even in the mountains, under stones, in holes in the earth, and other damp places. *Cardisoma guanhami*, another Antillean species, occurs with the former. *Cœnobita rugosa* is common all over St. Thomas, and causes a great mixture of marine and fresh-water shells. During their growth the crabs wander inland, taking with them Murices, Bullidæ and other marine forms. Arrived at the mountains, 800 meters above the ocean, they exchange these for Helix and Achatina in which they travel to the coast. The fresh-water species are *Palæmon olfersi*, *Atya scabia* and *Thelphusa margaritaria.*

Fishes.—On account of the possession of a drag-net adapted for the purpose, the *Talisman* was more fortunate than any previous exploring vessel in obtaining examples of deep-sea fishes. At one haul in 16° 52′ N. lat., and 27° 50′ W. long., and at a depth of 450 fathoms, no less than 1031 specimens were taken. The greatest depth at which a fish was obtained was 4255 meters, and the fish was *Bythites crassus.* Some of the species appear to inhabit very extensive zones of depth, thus *Alepocephalus rostratus* ranges from 868 to 3650 meters, *Scopelus maderensis* from 1090 to 3655 meters, *Lepioderma macrops* from 1153 to 3655 meters, and *Macrurus affinis* from 590 to 2220 meters. This great range appears to indicate a power of adaptation to the pressure of the water. Among the phosphorescent apparatuses found in these denizens of the deep, one of the strangest is that of *Eustomias obscurus*, a slender fish with a large mouth. From the under side of the chin depends a long filament ending in a rayed knob which is highly phosphorescent.——A. Cocco (*Il Naturalista Siciliano*), contributes some interesting notes on *Trachypterus cristatus* Bonelli, and describes it from an example 132 millimeters long, taken in the Straits of Messina. The six rays of the first dorsal greatly exceed the body in length.——G. Seguenza (loc. cit.), notices the occurrence of *Rhinobatus halari* in the seas of Sicily. The species was described by Ruppel from the Red sea, but has been taken at Palermo and on the Algerian coast. It attains the length of six feet.——The Marchese A. De Gregorio (*Il Nat. Sic.*, March), continues his notes on the Jurassic corals of Sicily, and describes four new species.——Miss Rosa Smith (Bull. Col. Acad. Sci., 1884), describes *Squalius lemmoni*, discovered by Mr. J. G. Lemmon in Rillito creek, near Tucson, Arizona.——Professor Greeff (Sitz. Ges. Natur. Marburg) describes *Gobius bustamentei* from St. Thomas.

Reptiles.—Dr. Strahl (Sitz. Ges. Bef. Natur. Marburg, 1882–83) describes the development of *Lacerta agilis, vivipara* and *viridis*, especially of the latter. The allantoïs, the changes in the ovum and the formation of the vascular system in the germinal disk, are given at length.

Mammals.—Professor Lieberkuhn (Sitz. Ges. Natur. Marburg, 1882), gives the results of his researches into the development of the ovum and embryo of the porpoise; and in the same proceedings, 1883, discusses the formation of the medullary canal in mammals generally.

PHYSIOLOGY.[1]

COLORING MATTERS OF BILE.—C. A. MacMunn is led by his observations to dispute a generally accepted view that the liver of invertebrates is nothing more than a pancreas in function; the most striking outcome would seem to be the discovery of the wide distribution of a coloring matter, which is beyond doubt a chlorophyll pigment; this it is proposed to call entero-chlorophyll. The author has chiefly relied on the evidence afforded by the spectroscope, for, as he points out, it is useless to expect that the chlorophyll in the state in which it occurs should be capable of developing oxygen in the presence of sunlight in the livers of Mollusca, or in the pyloric cæca of star-fishes, &c. The new body would appear to differ from plant-chlorophyll in that treatment with nitric acid makes the solution slightly greenish, although previously it may have been yellow. This is explained by the view that the pigment is in a more or less reduced condition, "probably due to the action of a ferment on the chlorophyll, or to the fact that it is sometimes present in the form of a radical or chromogen."

Spectroscopic measurements show that the liver of the oyster contains a coloring matter which, when treated in alcholic solution with nitric acid, gives the same spectrum as a similar solution of leaf-green when treated with that reagent. A large number of other Mollusca have been examined.

Among the Arthropoda, Crustaceans have alone been studied; in the common crab enterochlorophyll was rarely, but lutein con-

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[1] This department is edited by Professor HENRY SEWALL, of Ann Arbor, Michigan.